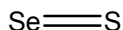


## SELENIUM SULFIDE

CAS No. 7446-34-6

First Listed in the *Third Annual Report on Carcinogens*



### CARCINOGENICITY

Selenium sulfide is *reasonably anticipated to be a human carcinogen* based on sufficient evidence of carcinogenicity in experimental animals (NCI 194, 1980). When administered by oral gavage, selenium sulfide induced hepatocellular carcinomas in rats of both sexes and female mice and alveolar/bronchiolar carcinomas and adenomas in female mice. When applied topically, selenium sulfide and Selsun<sup>®</sup>, an antidandruff shampoo containing 2.5% selenium sulfide, exhibited no carcinogenic effect in mice; however, these studies were not conclusive because the length of study was limited to 88 weeks by the relatively short lifespan of the strain of mouse (NCI 197, 1980; NCI 199, 1980). In 1975, an IARC Working Group considered that there were insufficient data available to evaluate the carcinogenicity of selenium compounds in animals. When applied topically in long-term studies, Selsun<sup>®</sup> did not induce tumors in mice or rabbits (Stenback, 1977). In view of a NCI/OTA correlative interpretation, the evidence (based on the NCI studies) may be regarded as sufficient (Griesemer & Cueto, 1980; OTA, 1981).

There are no data available to evaluate the carcinogenicity of selenium sulfide in humans.

### PROPERTIES

Selenium sulfide is an orange-yellow powder or tablet that is practically insoluble in water and organic solvents. When heated to decomposition, it emits toxic fumes of sulfur oxides (SO<sub>x</sub>) and selenium (Se).

### USE

EPA reports that selenium sulfide is used, especially in shampoos, to treat seborrhea; the chemical is available over the counter as Selsun<sup>®</sup>, a stabilized buffered suspension. In 1975, approximately 440 lb of selenium sulfide were consumed for pharmaceutical and cosmetic products (IARC V.9, 1975). FDA reports that selenium sulfide is an active ingredient in some drug products to treat dandruff and certain types of dermatitis. Additionally, selenium sulfide is used topically in veterinary medicine for eczemas and dermatomycoses. It is used in the manufacture of glass and photoelectric cells (HSDB, 1988).

### PRODUCTION

Chem Sources lists two suppliers of selenium sulfide in 1990 (Chem Sources, 1991). The 1986 Directory of Chemical Producers lists no current U.S. producers of selenium sulfide (SRIa, 1986). NCI reports that no separate current data on production or imports of selenium sulfide are available. In 1979, U.S. companies imported about 1,800 lb of selenium sulfide. The 1979 TSCA Inventory contained no production data on selenium sulfide, but it did identify two companies importing an unstated amount of selenium disulfide in 1977 (TSCA, 1979).

## EXPOSURE

The primary routes of potential human exposure to selenium sulfide are dermal contact, ingestion, and inhalation. A dandruff shampoo containing 1% selenium sulfide is available without prescription and is recommended for use once or twice a week. By prescription, a shampoo or lotion containing 2.5% selenium sulfide is available, with the recommended application limited to 10 minutes for 7 days to avoid the possibility of acute toxic effects. A 2.5% aqueous suspension of the chemical has also been approved by the FDA for marketing by prescription for treatment of Tinea versicolor fungal infection. Residues of selenium sulfide remain on the scalp after rinsing, although there is no substantial absorption through intact skin. Absorption has been reported in patients with open lesions on the scalp or in patients using a 1% cream on the back (NCI 199, 1980). A patient with scalp lesions that used selenium shampoos had a level of selenium sulfide as high as 32 µg/ml in her urine (NCI 194, 1980). NCI estimates that substantial potential exposure of the population to selenium sulfide is questionable. Workers are potentially exposed to airborne selenium sulfide dust during production, formulation, and packaging of consumer products. The National Occupational Hazard Survey, conducted by NIOSH from 1972 to 1974, estimated that 8,500 workers were possibly exposed to selenium sulfide in the workplace in 1970 (NIOSH, 1976). The National Occupational Exposure Survey (1981-1988) indicated that 2,965 total workers, including 2,490 women, potentially were exposed to selenium sulfide in the workplace (NIOSH, 1984).

Selenium is widely distributed throughout the environment, occurring in ground water, surface water, rocks, and soil. No data on the environmental occurrence of selenium sulfide are available. However, in 1976, EPA estimated that the medicinal industry generated about 700 lb of selenium sulfide wastes annually. Additional exposure information may be found in the ATSDR Toxicological Profile for Selenium (ATSDR, 1996c).

## REGULATIONS

EPA regulates selenium sulfide under the Resource Conservation and Recovery Act (RCRA) as a hazardous constituent of waste. OSHA adopted a permissible exposure limit (PEL) of 0.2 mg/m<sup>3</sup> as an 8-hr time-weighted average (TWA) for selenium compounds. OSHA regulates selenium sulfide under the Hazard Communication Standard and as a chemical hazard in laboratories. Regulations are summarized in Volume II, Table B-133.